

**Appendix 6. Proposed Minimum Data Elements for Ground Water Monitoring of Levels and Quality (and comparison to existing data models and standards)**

[“X”, similar data elements included in cited standard; “?”, similar data elements appear to be included in cited standard]

Data Element	Definition	Comparable USGS Data Element	ACWI – WQDE (Similar elements)	ASTM (Similar elements)	EDSC - ESAR (Similar elements)
<b>1.0 POINT OF CONTACT (Metadata collected and reported one time for a well or monitoring site)</b>					
1.1 Source of data	Identifies the primary source or provider of data, including name, address, telephone number, email address	(1) Agency code (2) Water level reporting agency	X		X
1.1.1 Organization Name	Legal formal name of organization that is the primary source of data	Water level reporting agency	X		
1.1.2 Mailing Address	Exact address where mail is intended to be delivered, including street, rural route and/or PO Box	(1) Address line 1 (2) Address line 2	X		
1.1.2.1 City, Town, Village Name	City where organization that collected information resides	City name	X		
1.1.2.2 State Name	State	USPS postal abbreviation code	X		
1.1.2.3 Mailing Address ZIP Code/Postal Code	5-digit Zone Improvement Plan (ZIP) code and 4-digit extension code (if available)	USPS zip code	X		
1.1.3 Telephone number	Telephone number (including area code) of the person who is the point of contact for the organization	Address phone number	X		
1.1.4 Electronic Mail Address	Electronic Mail Address (email) of the contact person at the organization	NI	X		

<b>2.0 SITE IDENTIFICATION/DESCRIPTION (Metadata collected and reported one time for a well or monitoring site)</b>					
2.1 Site Identifier	Unique site identifier consisting of latitude (DDMMSS), longitude (DDDMMSS), and sequence number (NN) (DDMMSSDDMMSSNN)	Site identification number	X	X	
<b>3.0 GEOLOGIC/HYDROLOGIC DESCRIPTION (Metadata collected and reported one time for a well or monitoring site)</b>					
3.1 Hydrologic basin		(1) Hydrologic unit code			?
3.2 Geologic unit(s) containing aquifer (Aquifer lithology; the lithology of the primary contributing unit(s))		[Geohydrologic units] Lithology code		X	X
3.3 Aquifer tapped (Principal Aquifer or other significantly used aquifer; primary unit(s)contributing water to the well)	USGS Atlas designation of aquifer	(1) Aquifer code (2) Aquifer name (3) National aquifer code (4) National aquifer name (5) Contributing unit		X	X
3.4 Local aquifer name (if applicable)		(1) Aquifer code (2) Aquifer name (3) Contributing unit		X	
3.5 Aquifer type	Type of aquifer	Aquifer type code		X	
3.6 Aquifer conditions: (1) confined or (2) unconfined or leaky confined		NI		X	

<b>4.0 WELL LOCATION (Metadata collected and reported one time for a well or monitoring site)</b>					
<b>4.1 Horizontal Location</b>					
4.1.1 Latitude	Measure of angular distance on a meridian north or south of the equator in degrees, minutes seconds, or decimal degrees	(1) Sexagesimal latitude (2) Decimal latitude	X	X	X
4.1.2 Longitude	Measure of angular distance on a meridian east or west of the prime meridian in degrees, minutes, seconds, or decimal degrees	(1) Sexagesimal longitude (2) Decimal longitude	X	X	X
4.1.3 Horizontal Reference Datum	The reference datum in to determine latitude and longitude coordinates.	Latitude/longitude (horizontal) coordinate datum	X		X
4.1.4 Location Horizontal Accuracy	The measure of accuracy (in feet) of the latitude and longitude coordinates	Latitude/longitude coordinate accuracy	X	X	
4.1.5 Location Collection Method	Method used to determine latitude and longitude coordinates for well	Method determining horizontal datum	X		
<b>4.2 Vertical Location</b>					
4.2.1 Altitude of Land Surface at Wellhead	Altitude of the ground surface for the well at which a measurement is being taken				
4.2.2 Altitude measurement method	Method used to determine altitude				
4.2.3 Altitude (Land surface elevation)	The measure of elevation above or the depth below a reference	Gage or land surface datum	X	X	X
4.2.4 Altitude accuracy	The accuracy of altitude measurement	Altitude accuracy code	X	X	
4.2.5 Vertical Reference Datum	Datum of altitude	Altitude datum code	X		X
<b>4.3 Well Address</b>					
4.3.1 Owner data	Owner Name	(1) Site owner number (2) Party identification number (3) Site owner type code		X	
4.3.2 Mailing Address	Exact address where well is located, including street, rural route, and house number	NI			
4.3.3 City or Town	Nearest City, Town, village where well is located	NI		X	
4.3.4 State name	State where well is located.	(1) State name (2) State FIPS code		X	
4.3.5 Tribal Reservation/Country	Tribal Reservation/Country where well is located.	FIPS country code as defined by FIPS PUB 10-4		X	
4.3.6 Mailing Address ZIP Code/Postal Code	5-digit Zone Improvement Plan (ZIP) code and 4-digit extension code (if available)				
4.3.7 Time Zone	Standard time zone of location of well	(1) Time zone code. (2) Time zone number. (3) Time zone name. (4) Time zone description		X	
4.3.8 Daylight Savings Zone flag	Identifies whether site location undergoes daylight savings time	(1) Time zone Daylight Saving Time code			

		(2) Time zone Daylight Saving Time name			
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<b>5.0 WELL CHARACTERISTICS (Metadata collected and reported one time for a well or monitoring site)</b>					
5.1 Local/State Identifier	State unique identifier/state permit number	Site Identification Number			
5.2 Depth of well		Well depth	X	X	X
5.3 Source of Data	The contributing source of the well depth data	(1) Reporting agency or entity (2) User name of person who created site record	X	X	
5.6 Casing depth of well		(1) Depth to casing string bottom (2) Well thickness of this casing (3) Well depth NOT CORRECT		X	X
5.7 Top of screened or open hole (rtd) (Depth to top of each open interval)		Depth to top of open interval	X	X	X
5.8 Bottom of screened or open hole (rtd) (Depth to bottom of each open interval)		Depth to open interval bottom	X	X	X
5.9 Casing material(s), if there is a casing		Casing material		X	X
5.10 Screen material type(s) at each open interval(s), if the well has well screen(s)		Casing material		X	?
5.11 Well type	Specified well type: (1) Background (2) Targeted	Type of network			X
5.12 Well Purpose	Indication of well purpose: (a) Quantity/Level (b) Quality (c) Both				
5.13 Well Log or Completion Report Available	Indication of well log or Completion Report availability: Yes/No				
<b>5.2 Measurement Location (Metadata collected and reported one time for each well)</b>					
5.2.1 Description of Measurement/Sampling/Reference Point	Location at which the measurement/sampling was done: (a) top of well above land surface (b) top of well at land surface (c) top of well below land surface	(1) Measurement point sequence number (2) Description of measurement point	X	X	X
5.2.2 Measurement/Sampling point height (Measuring point elevation relative to datum (rtd))	Height of measurement/sampling point from land surface elevation (altitude) in feet	(1) Height of measuring point (2) Measuring point altitude	X	X	X
5.2.3 Measuring/Sampling Point Accuracy of Measurement	Indication of accuracy of measuring the point of measurement or sampling in feet				

<b>6.0 MEASUREMENT/SAMPLING EVENT (Metadata collected and reported for each measurement and sampling event and data for water level measurement)</b>					
<b>6.1 Purpose</b>					
6.1.1 Monitoring Purpose	Specified monitoring purpose: (a) baseline (b) surveillance (c) trend (d) special studies	NI	X		
<b>6.2 Date and Time (Metadata collected and reported for each measurement and sampling event)</b>					
6.2.1 Time zone code	Code for which time zone datum is used for measurement	(1) Time zone code. (2) Time zone number. (3) Time zone name. (4) Time zone description			
6.2.2 Measurement/Sampling date/time					
<b>6.2.2.1 Level Measurement date and time (Data for water level measurement collected and reported for each measurement event)</b>					
6.2.2.2 Water-level measurement date	The calendar date when water level was measured, reported as 4-digit year, 2-digit month, and 2-digit day in YYYYMMDD format.	Water level date for ground water sites	X	X	X
6.2.2.3 Water-level measurement time	The measure of clock time and time zone when water level was measured, reported as a 24-hour day with 2-digit hour, 2-digit minute, and 2-digit second.	Water level time for ground water sites	X	X	X
<b>6.2.3 Quality Sampling date and time (Metadata for water quality sampling collected and reported for each sampling event)</b>					
6.2.3.1 Sample Collection Date	The calendar date when collection of the analyte was started, reported as 4-digit year, 2-digit month, and 2-digit day in YYYYMMDD format.	Sample start date	X	X	X
6.2.3.2 Sample Collection Time Measure	The measure of clock time and time zone when collection of the analyte was begun, reported as a 24-hour day with 2-digit hour, 2-digit minute, and 2-digit second.	?	X	X	X

<b>6.3 Measurement /Sampling Site Use (Metadata collected and reported each time for water level or water quality sampling event)</b>					
6.3.1 Site use at time of measurement/sampling event	Use of area immediately around well: Commercial, industrial, agricultural cropping, undeveloped pasture/range, forest, or residential at time of measurement or sampling event	(1)Primary use of site		X	
<b>6.4 Level Elevation Measurement (Data collected and reported each time for a water level measurement)</b>					
6.4.1 Water Level	Water level, in feet, reported to accuracy of measurement to the nearest ones, tenths, or hundredths of a foot	(2) Water level measurement referenced to land surface datum (2) Water level measurement referenced to measuring point (3) Water level measurement referenced to mean sea level	X	X	X
6.4.2 Measurement method	Method of water-level measurement	Water-Level Method of Measurement		X	?
6.4.3 Water level accuracy	Accuracy of water-level measurement in feet	[Water level] Accuracy code		X	
6.4.4 Water-level status	Status of water-level: (a) static (b) pumping	NI		X	
<b>6.5 Sampling Point Elevation Measurement (Metadata collected and reported each time for a water quality sampling event)</b>					
6.5.1 Sampling Point Elevation	Elevation in the well water column at which the sample was drawn, in feet, reported to accuracy of measurement to the nearest ones, tenths, or hundredths of a foot	(1) Water level measurement referenced to land surface datum (2) Water level measurement referenced to measuring point (3) Water level measurement referenced to mean sea	X	X	X
6.5.2 Sampling Point Elevation Measurement method	Method of sampling point elevation measurement	[Water level] Method code		X	?
6.5.3 Sampling Point Elevation accuracy	Accuracy of sampling point elevation in feet	[Water level] Accuracy code		X	
<b>6.6 Sample Collection (Metadata collected and reported for each water quality sample)</b>					
6.6.1 Sample Type	The type of sample being described. Permitted values include: (1) Sample (2) Duplicate sample (3) Other entries as applicable	NI	X		X
6.6.2 Sample Identification	The unique name, number, or code assigned to identify the sample.	Record number is the eight-digit number that identifies the water-quality sample	X	X	X
6.6.3 Sample Collection Method Code	An alphanumeric label to identify the sample collection method	NI	X	X	?

Data Element	Definition (from ACWI – WQDE, 2006)	Comparable USGS Data Element	ACWI - WQDE	ASTM (Similar elements)	ESDC - ESAR (Similar elements)
<b>7.0 WATER QUALITY RESULTS (data from Laboratory reported for each sample and analyte tested)</b>					
7.1 Result Value	Reportable numerical measure of the result for the chemical or microbiological analyte, or other characteristic, being analyzed	Value of result parameter	X	X	X
7.1.1 Result Value Unit of Measure	The name of the determinate quantity for a standard of measurement used for measuring dimension, capacity, or amount of something (e.g., mg/L, pCi/L, CFU/mL, etc.).	Parameter reporting units	X	X	
7.1.3 Analyte Name	The name assigned to a substance or feature that describes it in terms of its molecular composition, taxonomic nomenclature or other characteristic. This field is optional if the analyte is adequately described in one of the following subelements	(1) Parameter code (2) Parameter short name (3) Fixed-value domain element value (4) Fixed-value element short name	X		X
7.1.4 Chemical Identifier/Number (Chemicals only)	Chemical Identifier/Number is the unique number assigned to all chemical substances in the Chemical Abstract Service's (CAS) Registry or, in the EPA Chemical Registry System, to chemical groupings for which CAS Registry Numbers do not exist and cannot be assigned.		X	X	X
7.1.5 Biological Identification Number	The unique identification number assigned by either the Integrated Taxonomic Information System, (ITIS) the International Committee on Taxonomy of Viruses, or the EPA Biological Registry System .		X		X
7.1.6 Biological Systematic Context Name	The name of the classification system used to assign a systematic name to a biological entity.		X		
7.2 Analytical Method Number	The method number of the analytical method	(1) USGS Central Laboratory method code	X		X

	used, represented as a reference number: (a) EPA (Specify number) (b) ASTM (Specify number) (c) SM (Specify number) (d) Other methods as applicable	(2) Method type (3) Method name (4) Method description (5) [Water quality result] Laboratory method code			
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Footnotes:

USGS: United States Geological Survey (USGS) data elements listed in Appendix B.

ACWI: Advisory Committee on Water Information (ACWI). 2006. Water Quality Data Elements: A User Guide. NWQMC Technical Report No. 3. Washington, DC, USA. 166p.  
[http://acwi.gov/methods/pubs/wdqe\\_pubs/wqde\\_trno3.pdf](http://acwi.gov/methods/pubs/wdqe_pubs/wqde_trno3.pdf)

ASTM: American Society for Testing and Materials (ASTM) data elements listed in Appendix A.

EDSC: Environmental Data Standards Council (EDSC) data elements listed in Appendix C.